

PATENT

PROTECTED DISPLAY CASE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a protected display case for securely viewing and storing items such as jewelry, cameras, and guns.

2. Description of the Prior Art

A large variety of valuable items are routinely placed on display in stores to attract customers. Jewelry is one of the better known examples of such items. In the case of jewelry, and particularly for expensive jewelry, the display of the items creates a number of serious issues.

First, there is the issue of control over the items. If expensive jewelry is on display, the owner wants to be sure that the jewelry cannot be accessed by anyone other than authorized store personnel. Even then, the owner may want access to the jewelry by store personnel restricted to certain times and under certain conditions.

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1 Another issue concerns moving the jewelry. More
2 expensive jewelry may be moved from the display case
3 to a vault for storage when the store is not open for
4 business. In these situations there is the
5 possibility of damage to the jewelry in the
6 transportation process. Also, there is the chance
7 that some jewelry may be lost and/or mis-marked during
8 transport. Finally, it takes time to move the jewelry
9 from the vault to the display and vice versa. The
10 store must usually be closed during the setup process
11 and the employees are being paid for their time while
12 there are no customers in the store.

13 The last, but certainly not the least, concern is
14 for security. Should a robbery occur, the items need
15 to be safe even when on display.

16 In response to the need for a secure display
17 case, a number of solutions have been developed. Some
18 display cases incorporate break resistant glass, or
19 another type of transparent material, so that the
20 items on display can be viewed while still being more
21 secure than with just plain glass viewing windows.
22 While this is an improvement, it does not stop access
23 to the item from behind the display case where the
24 items are typically removed.

25 Another innovation was the use of a folding
26 shield as identified in U.S. Patent No. 4,929,862 to
27 Hamilton et al ("Hamilton"). In that patent, a
28 flexible cover can be drawn over the items. The cover
29 is comprised of a tamper resistant material and thus
30 makes it difficult for a potential thief to access the
31 items. There are two disadvantages to this solution.

1 First, the cover is moved manually. During
2 operating hours, the cover is not in position to
3 protect the items on display. If a robbery occurs
4 during this time, the employees will not have the
5 opportunity to put the cover in place.

6 Secondly, the narrow front panel that is intended
7 to add security also narrows the range of view for the
8 items on display. It is of critical importance to
9 have the merchandise on display visible as much as
10 possible to potential customers. When that range is
11 diminished, then to some degree sales must suffer.
12 That is an unacceptable consequence especially in the
13 jewelry business.

14 Another idea combines a shield and a moving
15 display tray. In United States Patent No. 5,733,021
16 to O'Neil et al ("O'Neil I") a solid shield and a
17 scissor type moving apparatus are used. First, the
18 scissor device moves the display items from a viewing
19 position in the top of the display case to a more
20 secure position in the bottom of the display case.
21 Once the items are in the bottom of the display case,
22 a solid shield can be inserted between the top and
23 bottom sections to prevent access to the items from
24 the top of the case. This has two disadvantages.

25 First, the scissor mechanism is not a reliable or
26 stable means for moving the display tray. As the
27 scissor mechanism raises the tray, the ends of the
28 arms of the scissors on the tray come closer together.
29 As a result, the support for the tray is not at the
30 ends where it is most effective, but somewhere between
31 the middle and the end. Therefore, the tray is not as

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1 stable as it would be if there were supports at the
2 opposing ends.

3 In the case where the scissor arms are fully
4 extended vertically then the display tray is supported
5 at virtually two points. This is very unstable. In
6 the case where the arms are about horizontal, it is
7 difficult to operate the scissor and to raise the
8 display case. This is due to the fact that the
9 scissor can fail to operate when the arms are fully
10 horizontal. In this position, more force is required
11 to move the arms than if the arms were in a more
12 vertical position. It is a characteristic of the
13 scissor device.

14 Secondly, the movement of the tray does not occur
15 in a steady or failure free manner. With only one
16 motor being used, all of the joints in the scissor
17 device tend not to respond to the forces involved at
18 the same time. This makes for an inconsistent
19 movement of the display tray that has its own
20 disadvantages. Due to the nature of the scissor
21 apparatus, there is no guarantee that the tray will be
22 in the same horizontal position in the raised and
23 lowered positions each time it is operated. This
24 affects the esthetic character of the items on display
25 since the display tray may not be flush with the rest
26 of the display area. It is also likely that if a
27 item, such as a piece of jewelry, were dislodged from
28 its display position and fell into the bottom part of
29 the case, then the scissor mechanism may crush or
30 mangle the item as the scissor mechanism operates. In
31 the case of valuable jewelry, this could be a
32 disaster.

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1 Lastly, the cover has the same disadvantages as
2 found in the Hamilton patent. In particular, the
3 cover in the "O'Neil I" patent must be manually
4 inserted. When there is a robbery attempt in
5 progress, the employees will not have the time or
6 opportunity to first lower the tray and then manually
7 install the shield. This is compounded by the fact
8 that neither the Hamilton nor "O'Neil I" patents
9 claims a break resistant viewing material in
10 conjunction with the security systems. Thus, when the
11 security divider is not in place, there is an
12 opportunity for the display window to be shattered and
13 the items on display removed.

14 United States Patent No. 5,791,749 to O'Neil et
15 al ("O'Neil II") is drawn to a secured display case,
16 but also suffers from the infirmities of the O'Neil I
17 and Hamilton patents.

18 First, the "O'Neil II" patent claims an obscuring
19 closure for covering the opening between the top and
20 bottom of the display case when the items are in the
21 bottom of the case. This obscuring closure is
22 operated by a hand crank system. The reason,
23 disclosed in the patent, for this procedure is that
24 the items are to be put on display each morning and
25 secured at night. Thus, employees have the time to
26 perform the manual operation. There is no mention as
27 to the device operating during an attempted robbery
28 while the store is open or the use of a motor to
29 operate the obscuring closure.

30 SUMMARY OF THE INVENTION

31 The invention is directed to a protected display
32 case for securely displaying items and for storing the

1 items when not on display. The display has a top and
2 bottom section, an access opening between the top and
3 bottom sections, a shelf to hold items, a lifting
4 mechanism, and a movable panel assembly.

5 The lifting mechanism has at least two guides
6 spaced apart and fixed in vertical locations, a motor,
7 and a gear assembly. The lifting mechanism raises the
8 shelf in relation to the guides to a position where
9 the items are within the top section and viewable to
10 customers and lowers the shelf where the items are
11 stored within the bottom section and not viewable.
12 When the shelf is in the lowered position, the movable
13 panel assembly covers the access opening thereby
14 securing the items within the bottom volume.

15 BRIEF DESCRIPTION OF THE DRAWINGS

16 Fig. 1 is front view of a protected display case,
17 absent the front peripheral covering side, showing the
18 display shelf and lifting mechanism in lowered
19 position.

20 Fig. 1a is a close-up view of one of the movable
21 shelf support and accompanying elements.

22 Fig. 2 is top view of a protected display case of
23 Fig. 1 with the movable panel assembly moving from
24 back to front and partially covering the access
25 opening

26 Fig. 3 is a top view of the protected display
27 case of Fig. 1 with the movable panel assembly fully
28 covering the access opening

29 Fig. 4 is top view of an alternate embodiment of
30 the protected display case with the movable panel
31 assembly moving from side to side and partially
32 covering the access opening

1 Fig. 5 is top view of the protected display case
2 of Fig. 4 with the movable panel assembly moving from
3 side to side and fully covering the access opening

4 Fig. 6 is a front view of the protected display
5 case of Fig. 1, absent the covering side and the
6 lifting assembly, showing in more detail the reel for
7 storing the moveable panel assembly positioned toward
8 the bottom of the bottom section

9 Fig. 7 is a front view of an alternative movable
10 panel assembly in which the panel is movable from one
11 side of the case to the other in an accordion like
12 manner

13 Fig. 8 is a top view of a protected display case
14 where the sides of the case are not parallel and the
15 movable panel assembly is partially covering the
16 access opening

17 Fig. 9 is a top view of a protected display case
18 of Fig. 8 with the movable panel assembly fully
19 covering the access opening

20 Fig. 10 is a front view of an alternative
21 protected display case, absent the front covering side
22 panel, illustrating the use of a lifting mechanism
23 that uses a chain.

24 Fig. 10a is a side view of the take-up reel.

25 Fig. 10b is a side view of the nut assembly.

26 Fig. 10c is a side view of the lead screw cog and
27 chain.

28 Fig. 10d is a top view of the lead screw cog and
29 chain.

30 Fig. 11 is a front view of a protected display
31 case of Fig. 1 with the display shelf in the raised

1 position showing the electronics for operating the
2 lifting mechanism and movable panel assembly.

3 Fig. 11a is a side view of a protected display
4 case of Fig. 11 with the covering side removed which
5 supports the display shelf.

6 Fig. 12 is a top cross-sectional view of the
7 carriage of Fig. 11.

8 Fig. 12a is a front view of the carriage of Fig.
9 12.

10 DETAILED DESCRIPTION OF THE DRAWINGS

11 The present invention may best be understood by
12 reference to the following description taken in
13 conjunction with the accompanying drawings. Fig. 1 is
14 a front view of a protected display case 22 having a
15 peripheral wall 44 (removed from the front in Fig. 1)
16 defining a top section 34 with a top volume 36, a
17 bottom section 40 defining a bottom volume 42, and
18 bottom 32. The peripheral wall of the bottom section
19 40 is composed of a penetration resistant material
20 such as hardened steel in the form of four panels
21 suitably secured together. The top section 34 has at
22 least one viewing window 38. The viewing window 38 is
23 preferably comprised of a breakage resistant material
24 such as tempered or bullet proof glass. Between the
25 top volume 36 and the bottom volume 42 is an access
26 opening 46. See Figs. 2-4. Items on the shelf 50 are
27 disposed within the top volume 36 when on display and
28 are stored in the bottom volume 42 when not on
29 display.

30 As an option, the shelf 50 can have a band 48
31 positioned about the edge of the shelf 50, the bend
32 bending in response to an obstruction such that items

1 would not be crushed when the shelf 50 is raised. See
2 Fig. 1a. In this configuration, an obstruction
3 between the shelf and the access opening, such as an
4 item of jewelry, would not be crushed. The shelf 50
5 is raised and lowered by a lifting mechanism 56, to be
6 described, and there is at least one door 92, shown in
7 dashed lines, mounted on the front side panel for
8 accessing the items.

9 In Fig. 1, the lifting mechanism 56 has a pair of
10 upstanding and spaced apart guide 62 at opposite ends
11 of the shelf 50. Each guide 62 is disposed along or
12 adjacent the peripheral wall 44. Each guide 62 in
13 Fig. 1 is aligned along a longitudinal axis 94 and in
14 the embodiment of Fig. 1 includes a track 100 having
15 track teeth 152. The track is adapted to cooperate
16 with a gear 108 such as a cogwheel. The gear 108 is
17 rotatable about an axle 168. Each guide 62 is in a
18 substantially vertical position, i.e., are thus
19 aligned vertically.

20 Fig. 1a shows the track teeth 152 working in
21 cooperation with the gear 108. The gear 108 is
22 rotatably mounted within a gear housing 96. As a rod
23 148 (second rod) turns, a worm gear 74 carried thereby
24 rotates and this rotation causes the gear 108 meshed
25 with the worm gear 74 to turn, which results in the
26 gear 108 moving up or down along the track 100. The
27 gear 108, worm gear 74, and gear housing 96 form a
28 movable shelf support 78. The gear housing 96 is
29 secured to the bottom of the shelf 50 and as a result,
30 the shelf 50 moves in relation to the guide 62 when
31 the gear 108 rotates.

1 Returning to Fig. 1, the rod 148 that is
2 connected to a coupling 144 that in turn is connected
3 to another rod 70 (first rod). The rod 70 is
4 connected to a U-joint 76 that is connected to a gear
5 box 64. A motor 58 drives the gear box 64, which in
6 turn rotates the U-joint 76, first rod 70, coupling
7 144, rod 148, and worm gear 74. As explained, the
8 worm gear 74 is secured in the gear housing 96 such
9 that the worm gear 74 is free to rotate but is in a
10 fixed position relative to the gear housing 96 to
11 allow for constant contact between the worm gear 74
12 and the gear 108. The movable shelf support 78, U-
13 joint 76, rod 70, coupling 144, and gear box 64
14 comprise the gear assembly 60 in Fig. 1. Thus,
15 operation of the motor 58 activates the gear assembly
16 60 resulting in the shelf 50 being raised or lowered.

17 Fig. 2 is a top view of the protected display
18 case 22 showing a movable panel assembly 80 partially
19 covering the access opening 46, which depicts the
20 movable panel assembly 80 during the process of
21 opening or closing. When the shelf 50 is extended
22 such that the items are in their viewable position,
23 the movable panel assembly 80 is in the open position.
24 It is to be noted that the access opening may be
25 considerably larger in comparison to the length and
26 width of the display case than that shown in Figs. 3-
27 4.

28 Fig. 3 shows the movable panel assembly 80 fully
29 covering the access opening 46. This is the closed
30 position of the movable panel assembly 80, which
31 occurs when the shelf 50 is within the bottom volume
32 42 and the items are stored out of view. In Fig. 4

1 and Fig. 5, a movable panel assembly 80' is displayed
2 moving from the opposing sides 26. In this
3 configuration, the movable panel assembly 80 is also
4 stored on a roller assembly 88 as shown in Fig. 1.

5 A panel motor 112 is connected via a brake and
6 reel (not shown) to a cord 114 which in turn is
7 connected to the front end of the individually hinged
8 panels 82 of the movable panel assembly 80. As the
9 panel motor 112 draws the cord 114, the individually
10 hinged panels 82 are drawn from the storage roller
11 assembly 88 to cover the access opening 46. The
12 roller assembly 88 is biased by a spring (not shown)
13 and when the panel motor 112 and its associated reel
14 and brake are not applying a force to the cord 114,
15 then the individually hinged panels 82 are moved back
16 and thereby uncovering the access opening 46.

17 Fig. 6 shows just the roller assembly 88 and
18 associated elements.

19 Fig. 7 shows a movable panel assembly 80' that
20 does not utilize a spring biased roller assembly 88,
21 but rather the individually hinged panels 82 are
22 stored in an accordion like manner 84 adjacent one
23 wall of the display case. The storage of panels in
24 this fashion allows the movable panel assembly 80'' to
25 be used in applications where there may not be
26 parallel opposing sides 26. Fig. 8 illustrates an
27 embodiment where there are two sides 24' that are not
28 parallel. The movable panel assembly 80' or 80''
29 moves in an arc to cover the access opening 46. The
30 movable panel assembly 80'' is adaptable to situations
31 where the opposing sides are parallel or not. Fig. 9
32 shows the movable panel assembly 80'' covering the

1 access opening 46, as when the shelf 50 is being
2 stored out of view.

3 Fig. 10 illustrates an alternative lifting
4 mechanism 56' that uses an endless chain 118, motor
5 58, at least one lead screw 154, and at least one nut
6 assembly 120. When the motor 58 is operating it moves
7 the chain 118 through a race track configuration. The
8 chain 118 turns the lead screw 154 and the rotation of
9 the lead screw 154 changes the height of the shelf 50
10 through the nut assembly 120 that is secured in place
11 to the shelf 50. The lead screw 154 has a
12 longitudinal axis and rotates about the longitudinal
13 axis as the chain 118 turns the lead screw 154. The
14 nut assembly 120 is a nut suitably secured to the
15 shelf 50 so that the nut does not rotate.

16 Fig. 10a is a side view of the take-up reel 142
17 (driven by panel motor 112) that holds the cord 114 as
18 the movable panel assembly 80 is moved from an open
19 position 86 to a closed position 90 or vice-versa.

20 Fig. 10b is a side view of the nut assembly 120.
21 The nut assembly 120 is in a relatively fixed position
22 to the shelf 50 and moves up or down in response to
23 the rotation of the lead screw 154 resulting in the
24 shelf 50 moving up or down.

25 Fig. 10c is a side view of the chain 118
26 contacting the lead screw cog 156 secured to the
27 bottom end of the lead screw 154. As the chain 118
28 moves, the lead screw 154 turns.

29 Fig. 10d is a top view showing a lead screw cog
30 156 secured to the lead screw 154. The chain 118
31 cooperates with the lead screw cog 156 such that as
32 the chain moves, the lead screw cog 156 rotates, which

1 in turn rotates the lead screw 154. The chain 118 and
2 lead screw cog 156 form an alternative gear assembly
3 60 to that identified in Fig. 1.

4 Fig. 11 shows the computer access port 102 for
5 connection to a computer (not shown) for operating and
6 monitoring the protected display case 22. Also
7 displayed is a manual control panel 104 for use by
8 store personnel. The manual control panel 104 can
9 include an up button 122, a down button 124, an alarm
10 button 126, and a key lock 128. A switch 130 is
11 activated when the shelf 50 is in the raised position
12 52 and stops the motor 58 from continuing to raise the
13 shelf 50. Another switch 132 is activated when the
14 shelf 50 is in the lowered position 54 and stops the
15 motor 58 from continuing to lower the shelf 50. At
16 some point while the shelf 50 is being lowered but
17 before it is in the fully lowered position 54, the
18 panel motor 138 is activated and the movable panel
19 assembly 80 is moved to its closed position 90. A
20 switch 134 is activated when the movable panel
21 assembly 80 is in the closed position 90 and the panel
22 motor 138 stops moving the movable panel assembly 80.
23 In this configuration, the items are secured within
24 the bottom volume 42.

25 At some point while the shelf 50 is being raised
26 from its lowered position 54, the movable panel
27 assembly 80 is retracted to its open position 86.
28 This is accomplished by the roller assembly 88, which
29 includes a spring to retract the movable panel
30 assembly 80. A switch 136 is activated when the
31 movable panel assembly 80 is in the open position 86.
32 When the shelf 50 is in the raised position 52, the

1 items are available for viewing by customers through
2 the viewing window 38.

3 Fig. 11a is a side view of the protected display
4 case 22 showing the panel motor 138 that drives the
5 take-up reel 142, the track 100, and the rail support
6 160.

7 Referring now to Fig. 12, one of the rail support
8 160 of Fig. 1 is shown in more detail connected a side
9 24 of the protected display case 22 such that there is
10 formed a cavity that houses the movable panel assembly
11 80. A comparable worm gear 74 on the other side of
12 the stabilizing assembly 166 houses the cord 114. A
13 hat shaped rail 158 works in cooperation with each
14 carriage 164. The carriage 164 includes the wheel 150
15 and the movable shelf support 78.

16 The center section of the hat shaped rail 158
17 supports the track 100 and the free outwardly turned
18 edges 162, or flanges, of the hat shaped rail 158
19 serve as a guide for the wheel 150 mounted on a gear
20 108. It is the contact between the edges 162, or
21 flanges, of the hat shaped rail 158 and the wheel 150
22 that substantially restrict the horizontal or tilting
23 movement of the carriage 164 so that the carriage 164
24 moves in a substantially vertical manner, i.e. with
25 substantially no lateral deviation as it moves up and
26 down the track 100. Thus, the carriage 164 moves in a
27 substantially vertical direction. The combination of
28 the hat shaped rail 158 and the carriage 164 comprises
29 a stabilizing assembly 166. Each carriage 164
30 supports the worm gear 74 so that rotation of the rod
31 148 rotates the gear 108 which in turn moves the

1 carriage 164 and shelf 50 up or down as was explained
2 in connection with Fig. 1.

3 Fig. 12a is a front view of one of the carriage
4 164 showing the wheel 150, the gear box 64, and the
5 gear 108.

6 It is important to note that many configurations
7 can be constructed from the ideas presented. For
8 example, multiple lifting mechanism 56, more than one
9 shelf 50, and more than one movable panel assembly 80
10 can be incorporated into a protected display case 22.

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